

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/36431

A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : H01J 37/08, H01J 4900; B01D 59/44 US CL : 250/281,282,288,427; 436/173 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 250/281,282,288,427; 436/173 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Please See Continuation Sheet		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,374,828 A BOUMSELLEK et al) 20 December 1994, see entire document.	1-25
Y	Herrmannsfeldt, W. B., "Electron trajectory program" Report 1979, SLAC-226, 119 pages, see entire document.	1-25
Y	Munro, E., "Computer programs for the design and optimization of electron and ion beam lithography systems" Nuclear Instruments & Methods in Physics Research 1987, Vol. A258, pages 443-461, see entire document.	1-25
Y	Shakun, N. G. et al, "A system of programs for the evaluation of charged particle trajectories in electric and magnetic fields" Izvestiya po Khimiiya 1989, Vol. 22, No. 3/4, pages 584-585, see entire document.	1-25
Y	Cohen, M. et al, "Effects of azimuthal and radial angular spread on electron beam focusing characteristics in the presence of space-charge forces" SPIE 1993, Vol. 2013, pages 24-42, see entire document.	1-25
Y	Ko, K. et al, "Modeling accelerator structures and rf components" AIP Conference Proceedings 1994, Vol. 297, pages 1-8, see entire document.	1-25
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"B" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search	Date of mailing of the international search report	
08 March 2005 (08.03.2005)	28 MAR. 2005	
Name and mailing address of the ISA/US	Authorized officer	
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450	Arlen Soderquist <i>[Signature]</i>	
Facsimile No. (703) 305-3230	Telephone No. 571-272-7000 <i>[Signature]</i>	

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C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Herrmannsfeldt, W. B., "Developments in electron gun simulation" SLAC-PUB-6498, May 1994, 28 pages, see entire document.	1-25
Y	Edgcombe, C. J., "Sources of velocity spread in electron beams from magnetron injection guns" International Journal of Infrared and Millimeter Waves 1995, Vol. 16, No. 1, pages 83-97, see entire document.	1-25
A	Ishihara, M. et al, 'A new ray tracing code "ELECTRA"' Nuclear Instruments & Methods in Physics Research 1992, 1992, Vol. 70, pages 445-450.	1-25
A	Ong, V. S. et al, "Why are electron capture negative ion mass spectra not reproducible? An ion source problem" Journal of the American Society for Mass Spectrometry 1993, Vol. 4, pages 270-277.	1-25
A	Tanabe, T. et al, "Computer simulations on RIKEN sub-millimeter FEL" Reza Kagaku Kenkyu 1994, Vol. 16, pages 25-28.	1-25

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Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-25

Remark on Protest

☐
☐

- The additional search fees were accompanied by the applicant's protest.
No protest accompanied the payment of additional search fees.

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BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-25, drawn to method and apparatus for generating low-energy electrons and using it for chemical sensing.

Group II, claim(s) 26-30, drawn to method and apparatus for inhibiting deposition of a non-conductive substance on an inner surface of an electrostatic analyzer.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the method and apparatus of Group I do not include an electrostatic analyzer while the method and apparatus of Group II are directed solely toward an electrostatic analyzer.

Continuation of B. FIELDS SEARCHED Item 3:

STN search in CA, INSPEC, INSPHYS and JICST-EPLUS files. Search terms: spherical, hemispherical, concave, cathode, electrode, electron, emitter, beam, source, mirror, revers?, attach?, captur?, ion, anion, focaus?, lens, optics, low, zero, radial, angular, longitud?, velocity, e, gun, trajectory, path?, energy, speed, electrostat?, refocus?, field, axial?, travel, direction, calculat?, model?, estimat?, code, algorithm, equation, theory, theore?, comput?, analy?, determin?, stack, shape, geometry, electric?, herrmannsfeldt, mebs, mafia, vector field, simulat?

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2004/016411

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl.⁷ B25J9/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl.⁷ B25J1/00-21/02, G05B19/18-19/46Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1926-1996 Toroku Jitsuyo Shinan Koho 1994-2004
Kokai Jitsuyo Shinan Koho 1971-2004

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 58-129503 A (Shinko Electric Co., Ltd.),	1
Y	02 August, 1983 (02.08.83),	2, 3, 6
A	Full text; all drawings (Family: none)	4, 5
Y	JP 7-20924 A (Matsushita Electric Industrial Co., Ltd.), 24 January, 1995 (24.01.95), Full text; all drawings (Family: none)	2, 3, 6

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principles or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
06 December, 2004 (06.12.04)Date of mailing of the international search report
21 December, 2004 (21.12.04)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.